IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:
LEFEBVRE *et al.*
Appl. No.: 10/656,836
Filed: September 8, 2003
For: **Protective Masking Film**

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Claim For Priority Under 35 U.S.C. § 119(a)-(d) In Utility Application

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Sir:

Priority under 35 U.S.C. § 119(a)-(d) is hereby claimed to the following priority document, filed in a foreign country within twelve (12) months prior to the filing of the above-referenced United States utility patent application:

Country	Priority Document Appl. No	Filing Date
Canada	2,401,794	September 6, 2002

A certified copy of each listed priority document is submitted herewith. Prompt acknowledgment of this claim and submission is respectfully requested.

Respectfully submitted,

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La présente atteste que les documents ci-joints, dont la liste figure ci-dessous, sont des copies authentiques des documents déposés au Bureau des brevets.

This is to certify that the documents attached hereto and identified below are true copies of the documents on file in the Patent Office.

Specification and Drawings, as originally filed, with Application for Patent Serial No: **2,401,794**, on September 6, 2002, by **MARKO I.R.D.C. INC.**, assignee of José Garrocho and Julien Lefebvre, for "Protective Masking Film".

Agent certificateur/Certifying Officer

June 13, 2005

Date

Canada

(CIPO 68)
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OPIC CIPO

PROTECTIVE MASKING FILM

ABSTRACT

The present invention provides a protective masking film that can adhere to and provide protection to the surface of a substrate, without the use of an adhesive. The masking film comprises two or more layers of which one of the outer layers is formed from Mxsite™ and the other outer layer formed from a polymer or polymers other than Mxsite™. The masking film is retackable. Also provided are compositions and methods for producing the protective masking film.

FIELD OF THE INVENTION

The present invention pertains to the field of masking films and more particularly to the field of protective masking films.

BACKGROUND

Masking films are used in numerous applications as a protective coating or covering for surfaces of various substrates, particularly smooth surfaces, such as acrylics, glass, polished or painted metals, glazed ceramics, and other smooth, relatively rigid surfaces. The masking film is applied to the surface to be protected and acts as a physical barrier to prevent scratching, scuffing and marring of the surface. Protection provided by masking films is particularly useful while these surfaces are being printed, transported, or otherwise handled prior to use.

In one example of a typical application of masking films, a polyolefin film to be used as a protective layer is applied to the surface of a substrate, which is a polymeric sheet, during the sheet manufacturing process, post extrusion but before the cutting operation. Polyolefin films commonly used in such a process are generally comprised of a three layer film with one layer being comprised of i) an ethylene vinyl acetate (EVA; 6-12% VA), and treated to 40 dynes of surface energy; ii) a copolymer of ethylene and acrylic acid (such as Primacor™ EAA sold by Dow or Nucrel™ EAA sold by DuPont); or iii) a copolymer of ethylene and ethylene ethyl acrylic acid salt (such as Surlyn™ sold by DuPont) with the other layers consisting of polyethylene (low density polyethylene (LDPE), linear low density polyethylene (LLDPE) or high density polyethylene (HDPE)). Alternatively, an embossed film such as disclosed in U.S. Patent Nos. 6,326,081 and 6,040,046 has been utilised. This technology shapes the film into small suction cups, which create a differential pressure on either side of the film in order to improve the adhesion of the film to the smooth sheet.

Films made with EVA as the key ingredient must be adhered to the surface of the substrate with heat and pressure and typically cannot be re-applied, or retacked.

This background information is provided for the purpose of making known information believed by the applicant to be of possible relevance to the present invention. No admission is necessarily intended, nor should be construed, that any of the preceding information constitutes prior art against the present invention.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a protective masking film. In accordance with an aspect of the present invention, there is provided an adhesiveless masking film, comprising from at least 2 layers, wherein one outer layer is formed from Mxsite™ and the second outer layer is formed from a polymer or polymers other than Mxsite™, and wherein the film is retackable.

In accordance with another aspect of the present invention, there is provided a three layer, adhesiveless masking film, wherein one outer layer is formed from Mxsite™ and the second outer layer is formed from a polymer or polymers other than Mxsite™, and wherein the film is retackable.

In accordance with another aspect of the present invention, there is provided a use of Mxsite™ in the manufacture of a protective masking film having at least 2 layers, wherein only one of the outer layers of the film comprises Mxsite™.

In accordance with another aspect of the present invention, there is provided an article of manufacture comprising a protective masking film adhered to a surface of a polymeric substrate, wherein the protective masking film is adhesiveless, retackable and comprises at least 2 layers including one outer layer that is formed from Mxsite™ and is in contact with the surface of the substrate and a second outer layer that is formed from a polymer or polymers other than Mxsite™.

BRIEF DESCRIPTION OF THE FIGURES

Figure 1 depicts a 3 layer masking film in accordance with one embodiment of the present invention.

Figure 2 depicts a typical assembly for lamination of a masking film according to one embodiment of the present invention to a polymeric substrate, such as a heavy gauge sheet.

DETAILED DESCRIPTION OF THE INVENTION

In accordance with the present invention there is provided a masking film that can adhere to and provide protection to a surface of a polymeric substrate, without the need for a separate adhesive layer. The masking film of the present invention exhibits high adhesion strength to other polymer surfaces, even at low application temperatures, does not leave residue on the surface following removal and is retackable without the use of adhesive. Retackability, as used herein, refers to the ability of the film to be removed from the surface to be protected and subsequently reapplied without loss, or with minimal loss, of adhesion strength. The polymeric substrate may be a polymeric substrate such as polycarbonate sheet, polyester sheet, copolyester sheet, abs sheet and acrylic sheet.

Components of the Masking Film

The protective masking film of the present invention comprises at least 2 layers and may be produced using a blown or cast film extrusion line as described in more detail below. The masking film of the present invention comprises an outer layer that consists of a polymer that is manufactured and sold by Eastman Chemical Company under the tradename Mxsite™, hereinafter referred to as "Mxsite™". The second outer layer does not comprise Mxsite™

Mxsite™ is a polyethylene cling resin LC78104-X that is sold by Eastman Chemical Company for use in the skin layers of cast stretch film. Mxsite™ polymers are advertised as providing a very aggressive cling force in both stretched and unstretched conditions. It has now surprisingly been found that Mxsite™ is useful in the manufacture of protective masking films.

In one embodiment of the present invention, the inner layer(s) of the masking film, if present, comprise a polymer selected from the group consisting of Mxsite™, linear low density polyethylene copolymer of hexane, low density polyethylene, an LLDPE copolymer of butene or octene, a metallocene catalysed polyethylene, a high density polyethylene, a low density polyethylene and any combination thereof. When used in combination the polymers may be present in any range of percentages.

A specific embodiment of the present invention is depicted in Figure 1, in which the masking film (10) comprises 3 layers, referred to herein as Layer A (12) , Layer B (14) and Layer C (16). In use, Layer A (12) will face the surface to be protected. Layer A (12) comprises 100 % Mxsite™. Layer A can be between 5 – 90 % of the total thickness of the film, or advantageously between 15 – 33 %.

Layer B (14), the middle layer of the film, comprises 100 % linear low density polyethylene copolymer of hexane. Alternatively, Layer B (14) comprises a polymer selected from the group consisting of Mxsite™, low density polyethylene, an LLDPE copolymer of butene or octene, a metallocene catalysed polyethylene, a high density polyethylene, a low density polyethylene and any combination thereof. When used in combination the polymers may be present in any range of percentages. Layer B (14) optionally comprises a colorant such as, but not limited to, titanium dioxide, phthalate blue, carbon black, iron oxide. Layer B (14) can be between 0 – 90 % of the total thickness of the film, or, advantageously, between 50 – 80 %.

Layer C (16), the other outside layer of the film, comprises 100% low density polyethylene or a polymer selected from the group consisting of linear low density polyethylene copolymer of hexane, an LLDPE copolymer of butene or octene, a metallocene catalysed polyethylene, a high density polyethylene, a low density polyethylene and any combination thereof. When used in combination the polymers may be present in any range of percentages.. Layer C (16) is optionally treated using a corona or flame treatment to increase the surface tension of the film and be printed. Layer C (16) can be between 0 – 90 % of the total thickness of the film, or, advantageously, between 15 – 33 %.

Additional materials may be added to one or more of the layers of the masking film in order to provide certain desired characteristics, including, for illustrative purposes only, roughness, abrasion resistance, printability, writeability, opacity and colour. Such fillers are well known in the industry and include, for illustrative purposes only, calcium carbonate (abrasion resistance), mica (printability), titanium dioxide (color and opacity) and silicon dioxide (roughness).

Manufacture of the Masking Film

The masking film of the present invention can be produced using a blown or cast film extrusion line. Typical blown film extrusion lines have been employed, using standard equipment and techniques known to workers skilled in the art, to manufacture the masking film of the present invention. In a specific embodiment, the 2 or more layers of the masking film of the present invention are coextruded using any coextrusion process known in the art. The use of coextrusion allows for the relatively simple and easy manufacture of a multilayered masking film composed of distinct layers, each performing specific functions. Although one embodiment of the present invention includes coextrusion of the masking film of the present invention, it is noted that the masking film can be bilayered or multilayered and that, regardless of form, the masking film can be produced using any other suitable method, if desired, as would be well understood by a worker skilled in the relevant art.

In one embodiment of the present invention, the film is formed as a tube. In this case the flattened masking film is trimmed at each extremity to modify the shape of the flattened sheet from the tube. In a specific embodiment, a three layer masking film is formed as a tube and Layer A of the three layer film is the inside layer of the tube.

The film can be printed on if desired, however, the printing process must be done within 24 hours of the film extrusion so that no build up of the Mxsite™ occurs on the printing plates.

In order to confirm the adhesion properties of the masking film of the present invention, twenty-four hours following extrusion, a sample of the film is applied using finger pressure to a polycarbonate sheet. So that the test accurately mimics commercial application

of the masking film, it is important to ensure that the sheet is free and clear of any smudges or dust. The film is then removed and the surface is visually examined for evidence of residue. The film is then retacked onto the sheet and the peel strength is verified. The masking film of the present invention does not leave residue on the surface and exhibits good peel strength, initially and following retacking.

Use of the Masking Film

One aspect of the present invention provides the use of the masking film of the present invention in adhering to and protecting a surface of a substrate. In use, the surface of the outer layer consisting of Mxsite™ is brought into intimate contact with the surface to be protected. Any one or more of a number of conventional application methods can be used to bring the surface of the first layer of the masking film into intimate contact with the surface of the substrate to be protected by the masking film. Typically, the masking film will be applied to the surface to be protected via a nip roll or similar system through which the masking film and the substrate surface to be protected are passed simultaneously. If desired, the resulting article can be passed through compression rolls or the like for further processing. Any other suitable method for combining the masking film with the substrate surface to be protected can be used, if desired.

In a specific embodiment of the present invention, the masking film is applied using a typical lamination assembly as depicted in Figure 2. Along a line a substrate to be protected, the masking film (10) is guided, using an idler roll (30), into intimate contact with the surface of a substrate (20), for example in the form of a heavy gauge sheet. The masking film and substrate are passed between nip rolls (40) simultaneously. The nip rolls provide a predetermined pressure in order to facilitate uniform adhesion of the masking film to the substrate. As depicted in Figure 2, an air piston (50) can be used to generate the predetermined pressure.

The masking film of the present invention is able to be applied to the surface to be protected at lower application temperatures than required for standard lamination processes. n particular, the masking film can be applied at normal room temperatures or up to 121 °C with minimal difference in resulting adhesion. This allows marring of the surface to be minimised

while maintaining good control of adhesion. Furthermore, the film is not susceptible to shrinkage during the application process since high application temperatures are avoided. This results in better protection of the surface since the film will adhere throughout the surface, including near its edges.

The present invention also includes articles of manufacture comprising a masking film of the present invention. Such articles of manufacture include a bilayer or multilayer film, in which one outer layer comprises or consists of Mxsite™ and the other does not, retackably adhered to a surface of a substrate to be protected.

The invention being thus described, it will be obvious that the same may be varied in many ways. Such variations are not to be regarded as a departure from the spirit and scope of the invention, and all such modifications as would be obvious to one skilled in the art are intended to be included within the scope of the following claims.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. An adhesiveless masking film, comprising at least 2 layers, wherein one outer layer is formed from Mxsite™ and the second outer layer is formed from a polymer or polymers other than Mxsite™, and wherein the film is retackable.

2. Use of Mxsite™ in the manufacture of protective masking film.

3. Use of an adhesiveless masking film, comprising at least 2 layers, wherein one outer layer is formed from Mxsite™ and the second outer layer is formed from a polymer or polymers other than Mxsite™, to protect a surface of a polymeric substrate.

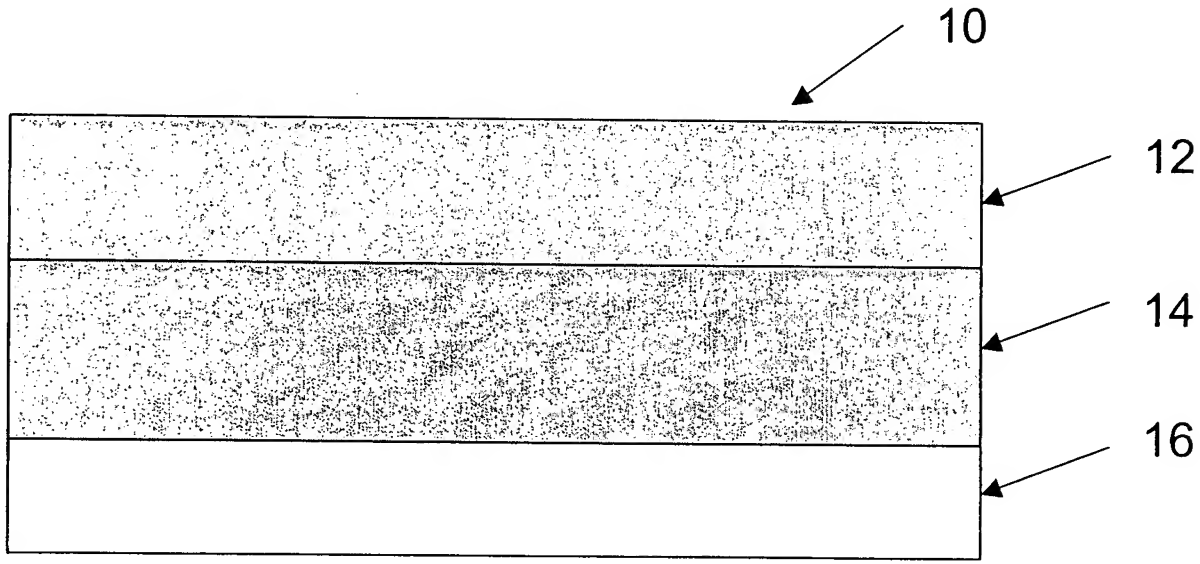

Figure 1

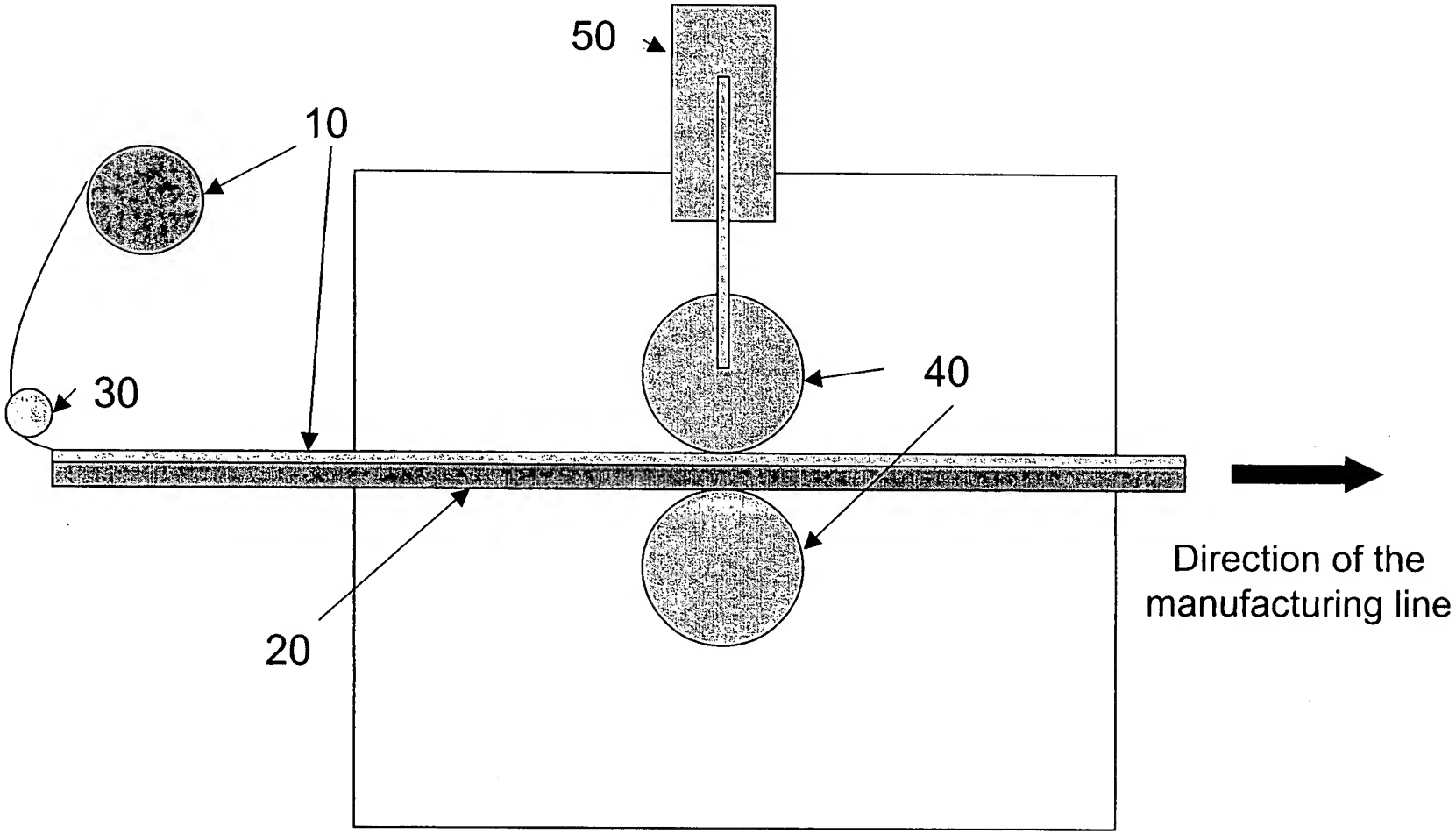

Figure 2